DRAFTING
12-22-32

CURRICULUM
T
351.5
A32
1982
ALTA
604.2
1982
Gr10-12
CURRGDHT
CURR

INDUSTRIAL EDUCATION

Curriculum Guide

Alberta
EDUCATION
1982

TABLE OF CONTENTS

Page

Acknowledgements .....(ii)

INDUSTRIAL EDUCATION

Rationale 1

Programs 1

Objectives 2

INDUSTRIAL EDUCATION 12-22-32 PROGRAM 4

CAREER FIELD 5

CAREER OPPORTUNITIES 6

COURSE CONTENT

Drafting 12 7

Drafting 22A 16

Drafting 22B 24

Drafting 22C 29

Drafting 32A 35

Drafting 32B 40

Drafting 32C 45

ACKNOWLEDGMENTS

Alberta Education acknowledges with appreciation the contribution of the following Ad Hoc Committee members to the preparation of this guide.

DRAFTING

Roy Burke	Western Canada Composite, Calgary
Morris Den Otter	M.E. LaZerte Composite, Edmonton
Roger Mestinsek	Youth Assessment Centre School, Grand Prairie
F. Appelt	Northern Alberta Institute of Technology, Edmonton
Jack Smith	Alberta Education, Calgary
Dr. J. Harder	Alberta Education, Edmonton
A.A. Day	Alberta Education, Edmonton
J. Pallas	Alberta Education, Edmonton
A. McCaughan	Alberta Education, Edmonton

NOTE: This Curriculum Guide is a service publication only. The Senior High School Program of Studies contains the official statement concerning Senior High School courses. The information contained in the Guide is prescriptive insofar as it duplicates that contained in the Program of Studies. There are in the Guide, however, as well as content, methods of developing the concepts, suggestions for the use of teaching aids and lists of additional reference books.

INDUSTRIAL EDUCATION

RATIONALE

Industrial Education is a program consisting of courses which provide a continuum of experiences, starting with exploratory activities in the junior high school and expanding in the high school to the development of skills related to career fields. This development of the student's skills is planned for through courses in industrial and vocational education culminating in on-the-job work experience, or entry into a job or post-high school institution for further education.

The program consists of courses ranging from those designed for an exploration of the technologies and trade areas to units of practical preparation for a career. In the process the courses develop the student's self-knowledge, talents, and skills.

For information on sequencing and course description, refer to the "Handbook In Industrial Education for Guidance to Teachers, Counsellors and Administrators".

PROGRAMS

There are two parts to the Industrial Education program. The first part consists of the I.E. 10, 20, 30 series of courses and is designed for career orientation. These courses were developed primarily for students in laboratories that utilize the multiple activity approach as found in most smaller schools, but they can be taught in unit shops as well.

The second part consists of the I.E. 12, 22, 32 series of courses and is intended for career development. The courses are planned for use in schools where facilities are available to teach specific occupational areas.

Students may progress from the I.E. 10, 20, 30 series to the 22 level courses upon meeting specified basic prerequisites or upon recommendation of their principal.

Both sections of the program focus on seven career fields. These are:

Graphic Communications
Mechanics
Construction and Fabrication
Electricity-Electronics
Personal Services
Performing Arts
Horticulture

The I.E. 10, 20, 30 courses consist of a number of one credit modules related to the career fields while the I.E. 12, 22, 32 courses consist of a number of five credit modules of specific occupational content. Completion of seven five credit modules qualifies the student for recognition by the Apprenticeship Branch for credit towards a journeyman's certificate.

It is left to the administrators of the school to offer the courses or combination of courses best suited to the needs and interests of the students and the financial resources of the district.

Courses offered at the 22 and 32 level have to meet special criteria for staff and facilities. The Industrial Education Consultant must authorize these in order to qualify the students for vocational grants.

OBJECTIVES OF INDUSTRIAL EDUCATION

The Industrial Education Program can help achieve the Goals of Schooling and Education. The course objectives are more focused and give direction to the teacher.

The objectives of Industrial Education are classified in three areas with the following purposes:

A. Personal Growth

To provide opportunities for the individual growth of the student through the development of acceptable personal and social values necessary in a productive society.

1. To provide a technical environment which motivates and stimulates individuals to discover their interests and develop personal and social responsibilities.

2. To assist in the development of positive attitudes toward safety.

3. To assist in the development of positive attitudes toward conservation and environment.

4. To assist in the development of consumer literacy.

B. Career Exploration:

To develop basic competencies, integrating cognitive and psychomotor skills to enter a family of occupations or post-secondary institutions for further education.

1. To provide exploratory experiences in the use of tools, equipment and materials appropriate to various technologies prevalent in a productive society.

2. To develop an understanding of the interrelationship of various technologies.

3. To provide a technical environment for students to synthesize their accumulated knowledge in the solution of practical problems.

4. To assist the student to develop habits that will be conductive to the establishment of a safe environment.

C. Occupational Skills:

To develop basic competencies, integrating cognitive and psychomotor skills related to families of occupations.

1. To provide safe exploratory experiences in the use of tools, energy, equipment and materials appropriate to various technologies prevalent in a productive society.

2. To develop an understanding of the interrelationships of various technologies.

3. To provide a technical environment which permits students to synthesize their accumulated knowledge in the solution of practical problems, and to assist students to develop habits that will be conducive to the establishment of a safe environment.

INDUSTRIAL EDUCATION 12, 22, 32 PROGRAM

INTRODUCTION

The Industrial Education 12, 22, 32 program is a series of modules which develop competencies leading to seven different career fields.

Entry into a career field may be gained by taking one of several introductory courses. These are:

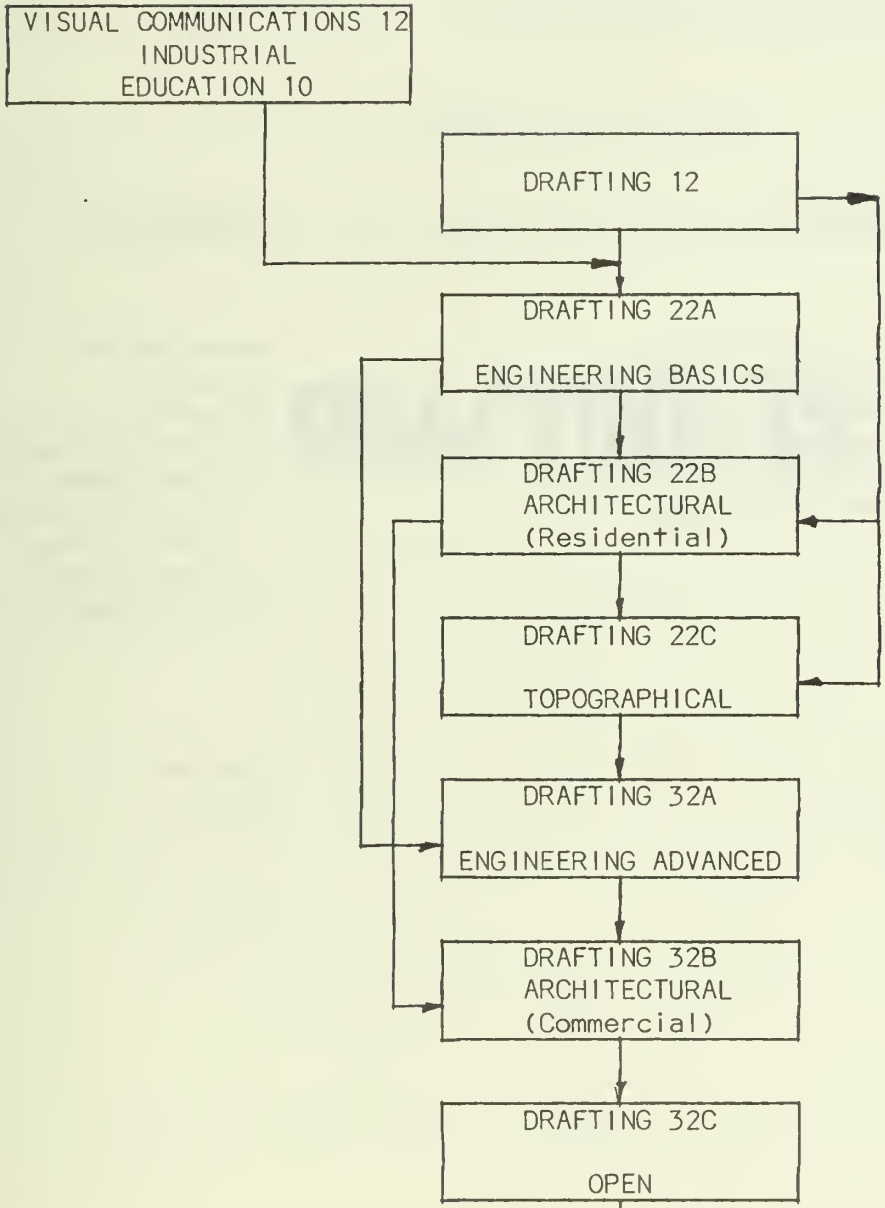
1. the "12" course designated for each major, or
2. two modules from the Industrial Education "10, 20, 30" series related to the anticipated major, or
3. one half of a "12" course. The other half would be another half "12" or a module from the "10" program. The course would be recorded as Industrial Education "10".

Following the introductory course the student may advance to the major area of study by selecting any number of five credit modules from the courses designated as "22" or "32". The scheduling and sequencing of the modules is the responsibility of the local school personnel but must be in accordance with the regulations pertaining to prerequisites.

A student registered in a second or third level course ("22" or "32") is regarded as taking a major in that course area. Having established a major the student may select courses designated as minors and in this way broaden his/her practical skill base in a career field or even several career fields. However, students must complete all the preceding modules in a major series (usually six) before taking the 32C module (exception: Beauty Culture).

CAREER FIELD

DRAFTING



Minor

Building Construction
Machine Shop
Electricity-Electronics
Welding
Sheet Metal

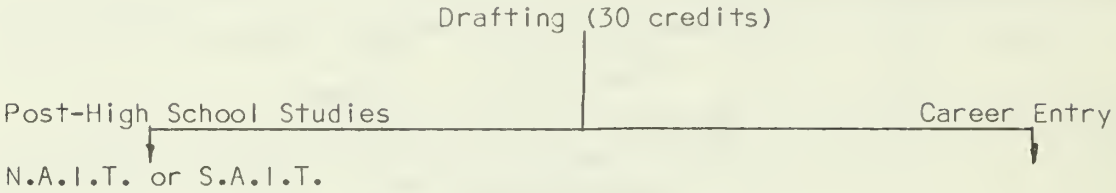
Piping
Graphic Arts
Visual Communications

Related

Industrial Education
Business Education
Work Experience

CAREER OPPORTUNITIES

Students taking most or all of the modules in the Drafting major may look forward to the following opportunities:



N.A.I.T. or S.A.I.T.

Architectural Technology	Draftsperson
Building Construction Technology	Surveying
Drafting Technology	Estimating
Surveying Technology	Engineering Assist.
Engineering Graphics Technology	Related Trades
Environmental Technology	- Building Trades
	- Machine Shop
	Planning (town)
	Oil Well Logging

UNIVERSITY

Engineering	Engineer
Education	Teacher
Agriculture	
Arts	

DRAFTING 12

COURSE CONTENT

DRAFTING 12 (5 CREDITS)

INTRODUCTION

This Drafting course is designed to provide the student with experiences that allow him/her to sample the various kinds of drawings used within the field generally. These activities should enable the student to make an informed decision about further studies in the drafting field.

OBJECTIVES

The objectives of Drafting 12 are:

1. To provide a practical environment which will enable a student to make a more realistic assessment of his/her interests and aptitudes.

2. To allow a student to develop basic knowledge, understanding and appreciation of drafting processes and materials.

REFERENCES

*French, Urbanik, Svensen, Helsel, Mechanical Drawing, (S.I. Metric) McGraw-Hill Ryerson.

Canadian Standards Association. Mechanical Drawing Standards, B 78-1.

Davis, E.J., and H.F. Skinner. New Basic Drafting, General Publishing Co. Ltd.

Jensen, C.H., and F.H. Mason. Drafting Fundamentals, McGraw-Hill Ryerson.

Sterling, N. Introduction to Technical Drawing, Gage Publishing Co.

*Refers to primary text.

CONTENT SUMMARY:

1. Introduction to Drafting
   - standardized symbolic language
   - quality criteria

2. Drafting equipment
   - use, care and adjustment of tools
   - characteristics of lines

3. Geometric construction
   - basic geometric shapes
   - drawing techniques

4. Reproduction of Drawings
   - materials used
   - processes

5. Shape Description
   - multiview drawings
   - pictorial drawings
   - sketching

6. Size Description
   - dimensioning practices
   - special features and specifications

7. Auxiliary Views
   - primary auxiliary views
     (true size and shape of inclined surfaces)

8. Sectioning
   - types of sections
   - materials representation

TOPIC 1: INTRODUCTION TO DRAFTING VD12

GENERALIZATION: Drafting is a concise, symbolic international language used by engineers, architects, builders, drafters and tradesmen to convey essential information.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Need for a standardized symbolic language	- describe where this language of industry is more efficient and effective than the written or oral language - explain the place of the drafter in modern technical society	2 hours	
2. Need for accuracy neatness legibility	- properly border a drawing plate with title block - draw a simple exercise		

NOTES:

TOPIC 2: DRAFTING EQUIPMENT VD12

GENERALIZATION: Drafters use precise measuring and layout tools in the preparation of drawings.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Use, care and adjustment of tools	- draw simple pencil drawings that involve use of scales, set-squares parallel rules or T-squares and/or drafting machines, dividers and compasses	10 hours	
2. Line weight	- complete all drawings using correct line weights and densities		
3. Line symbol	- use appropriate line symbols		

NOTES:

TOPIC 3: GEOMETRICAL CONSTRUCTION VD12

GENERALIZATION: A knowledge of geometrical constructions is essential to produce accurate drawings.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES

1. Basic shapes:
 	
- smooth transfer to and from straight and curved lines
	The student will:
	
	- use drafting tools and drafting procedures to construct;
	  - horizontal lines
	  - vertical lines
	  - slant lines (15^{o} multiples)
	  - parallel lines
	  - geometric shapes
	  - tangent arcs to lines
	  - tangent arcs to arcs or circles
	  - reverse curves
	
	- produce drawings to enlarged and reduced scale
		20 hours	

NOTES:

TOPIC 4: REPRODUCTION OF DRAWINGS VD12

GENERALIZATION: Original drawings are reproduced for distribution and also for the protection of the master.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Materials used for originals	- produce simple originals using a variety of materials (e.g., paper production, linen, film)	3 hours	
2. Reproduction processes	- reproduce copies using the white print process and other available processes		

NOTES:

TOPIC 5: SHAPE DESCRIPTION VD12

GENERALIZATION: Objects are represented by the use of a number of projection methods.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCE
	The student will:		
1. Orthographic multi-view projection: - use of projectors - relationship of views (third angle) - object lines - hidden lines	- produce a number of orthographic multi-view drawings of various objects	50 hours	
2. Pictorial drawings: - isometric - perspective	- produce a number of pictorial drawings of various objects using isometric and oblique drawing systems - draw a simple object in perspective using one and two vanishing points		
3. Pencil and line control to "think on paper"	- demonstrate freehand sketching skill and drawing interpretation by: - solving missing line problems - solving missing view problems - convert orthographic drawings or sketches to pictorial sketches - convert pictorial sketches to orthographic multi-view sketches		

NOTES:

TOPIC 6: SIZE DESCRIPTION VD12

GENERALIZATION: The size of an object is defined by using accepted dimensioning procedures.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCE
1. Size and location description 2. Special features and specifications	The student will: - dimension a variety of shapes and drawings using acceptable dimensioning practices - letter freehand, notes, specifications, title blocks and exercises in vertical, upper case gothic lettering	15 hours	

TOPIC 7: AUXILIARY VIEWS VD12

GENERALIZATION: Views other than the principal views are sometimes required to describe special features of the object.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
1. Primary auxiliary views: - true size and shape of inclined surfaces	The student will: - draw auxiliaries of simple symmetrical and non-symmetrical slanted surfaces	15 hours	

NOTES:

TOPIC 8: SECTIONING VD12

GENERALIZATION: Special internal features are shown by the use of sectioned drawings.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCE
	The student will:		
1. Sectioned drawings	- produce sectioned drawings of simple objects: - full section - partial section - section through ribs and spokes - section through odd number of spokes	10 hours	
2. Material representation	- draw sections representing a variety of materials		

NOTES:

DRAFTING 22A

COURSE CONTENT

DRAFTING 22A (5 CREDITS)
(ENGINEERING BASICS)

INTRODUCTION

After having completed one of Visual Communication 12, Industrial Education 10 or Drafting 12, a student may advance to Drafting 22A.

OBJECTIVES

The objectives of Drafting 22A are to provide study in:

1. The application of drafting theory and techniques consistent with mechanical drawing standards.

2. Fabrication processes.

3. Materials, their properties and use.

REFERENCES

*French, Svensen, Helsel, Urbanek, Mechanical Drawing, (S.I. Metric) McGraw-Hill Ryerson.

Canadian Standards Association, Mechanical Drawing Standards, B78-1.

Jensen, C.H., Engineering Drawing and Design (2nd Edition SI Metric) McGraw-Hill Ryerson.

Weaver, Process Piping Drafting (2nd Edition) Gulf.

Giesecke, F.E., et. al. Technical Drawing and Design, McGraw-Hill Ryerson.

*Refers to primary text.

CONTENT SUMMARY

1. Shape and Size Description
   - orthographic multi-view projections
   - pictorial drawings

2. Fasteners - mechanical
   - threads
   - common thread fasteners
   - special fasteners
   - miscellaneous fasteners

3. Fasteners - non-mechanical
   - adhesion
   - cohesion

4. Forming Processes
   - casting drawings
   - forging
   - cold heading and powder metallurgy in relation to drawings
   - machining drawings
   - other forming methods

5. Elementary Piping
   - materials used
   - joining pipe
   - representing piping systems

6. Detail and Assembly Drawings
   - detail drawings
   - assembly drawings
   - checking

7. Computer Graphics (optional)
   - computer assisted drafting (C.A.D.)

TOPIC 1: SHAPE AND SIZE DESCRIPTION VD22A

GENERALIZATION: The shape and size of an object is represented by using standardized projection systems and dimensioning techniques.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Orthographic multi-view projection: - planes of projection - use of projectors - relationship of views (third angle) - object lines - hidden lines - hidden features - sections - auxiliary views - dimensioning	- explain, using correct terminology the theory used for producing orthographic multi-view drawings - produce orthographic multi-view drawings and sketches with emphasis being given to neatness, accuracy and correct line weights - produce multi-view drawings incorporating full sections, half sections,offset sections, revolved section, removed sections, ribs, webs and spokes - dimension drawings according to standard practice and freehand letter necessary notes, specifications and other pertinent data	15 hours	Jensen Ch. 3, 5-17 Jensen Ch. 7 & 9
2. Pictorial drawings: - isometric - oblique - perspective	- explain the difference between isometric drawing and isometric projection - explain the difference between isometric drawing, oblique drawing (cavalier and cabinet) and perspective drawing (one and two point) - produce a number of dimensional pictorial drawings - produce perspective drawings (one and two point)		

TOPIC 2: FASTENERS - MECHANICAL VD22A

GENERALIZATION: Product components are fastened frequently by using standardized mechanical fasteners.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Threads: - thread forms - representation	- plot a helix - draw a square thread, true representation - explain thread forms (square, acme, buttress, sharp vee, unified and ISO metric) - explain thread terminology (crest, root, pitch, major diameter, pitch diameter, depth of thread, left hand, right hand and multiple threads) - draw and specify various screw threads (detailed representation, schematic representation and simplified representation)	25 hours	
2. Common threaded fasteners	- draw common threaded fasteners and explain where each is used (bolts, machine screws, cap screws, studs)		
3. Special fasteners	- draw and/or specify special fasteners etc. and explain where each is used. (Set screws, lock nuts, captive or self retained, single thread, engaging nuts, sealing fasteners)		
4. Miscellaneous fasteners	- draw and/or specify miscellaneous fasteners such as: - key splines - retaining rings - springs - rivets		Jensen Ch. 9

TOPIC 3: FASTENING - NON MECHANICAL VD22A

GENERALIZATION: Product components are fastened frequently by non-mechanical means.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
1. Adhesion: - bonding 2. Cohesion: - soldering - brazing - welding	The student will: - explain and specify simple adhesion procedures - explain and specify simple cohesion procedures using appropriate notes and symbols	10 hours	Jensen Ch. 11

TOPIC 4: FORMING PROCESSES VD22A

GENERALIZATION: Materials are formed and/or shaped in a variety of ways.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
1. Casting	The student will: - explain the differences, advantages and disadvantages of the various casting methods: - sand mould - shell mould - plaster mould - permanent mould - investment mould - full mould - centrifugal casting - continuous casting - die casting	20 hours	Jensen Ch. 10

TOPIC 4: FORMING PROCESSES (continued) VD22A

GENERALIZATION: Materials are formed and/or shaped in a variety of ways.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	- produce drawings which employ casting methods		
2. Forging: - types - design	- explain the advantages and disadvantages of forging - produce a drawing which employs the forging process		
3. Cold heading & powder metallurgy	- explain where these processes are used and outline their advantages and disadvantages		
4. Machining	- explain the basic machining processes of turning, boring, shaping, milling, drilling, etc. - produce drawings employing the basic machining operations		
5. Other forming methods: - extruding - deep drawing - spinning - roll forming	- explain where these processes are used and outline their advantages and disadvantages		

NOTES:

TOPIC 5: ELEMENTARY PIPING VD22A

GENERALIZATION: Liquids and gases are transported through piping systems which have been designed and drawn in engineering offices.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Materials used in piping	- explain where various material is used and outline the advantages and disadvantages of each: - cast iron - carbon steel - steel all up - non-ferrous metal - plastic - concrete - ceramic	25 hours	
2. Joining pipe	- explain how pipes are joined together into piping systems employing a variety of fittings and joining techniques		
3. Representing piping systems	- produce working drawings of piping systems using (double line), single line and isometric single line drawings		

NOTES:

TOPIC 6: DETAIL AND ASSEMBLY DRAWINGS VD22A

GENERALIZATION: Complex machines and structures are described by the use of assembly, sub-assembly and detail drawings.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Detail drawings	- produce detail drawings complete with shape description, size description, shop notes specifications and bill of materials	35 hours	
2. Assembly drawings	- produce assembly drawing		
3. Checking	- check drawings for errors		

TOPIC 7: COMPUTER GRAPHICS (optional) VD22A

GENERALIZATION: Computers linked to plotters assist drafters in the design and production of drawings.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
Computer Assisted Drafting (C.A.D.)	- use a computer linked X.Y. plotter to produce simple drawings where equipment is available		

NOTES

DRAFTING 22B

COURSE CONTENT

DRAFTING 22B (5 CREDITS)
(ARCHITECTURAL DRAFTING)

INTRODUCTION

Drafting 22B, Architectural Drafting follows Drafting 12 or Industrial Education 10 and prepares students to enter other drafting modules particularly Drafting 32B.

OBJECTIVES

The objectives of Drafting 22B are:

1. To provide students with basic knowledge and skills in the residential architectural field.

2. To provide students with knowledge of house building standards, terminology, and design factors.

3. To provide students with the ability to read and interpret the appropriate building codes and standards.

4. To have students develop drafting skills and techniques in this field of drafting.

REFERENCES

*Hepler and Wallach, Architectural Drafting and Design, (3rd Ed.) McGraw-Hill Ryerson.

CMHC Choosing a House Design

Goodban and Mayslett, Architectural Drawing and Planning McGraw-Hill Ryerson.

Uornung, Architectural Drafting Prentice Hall

Jensen, Cecil, Engineering Drawing and Design (2nd Edition, SI metric) McGraw-Hill Ryerson

National Research Council Residential Standards - Canada

Spence Architecture Design Engineering Drawing McKnight Publishing Co.

Stegman and Stegman, Architectural Drafting American Technical Society.

Canadian Government Specifications Board Architectural Drawing Practices.

Humphreys, Barbara Architecture As Living History (120 slides) Reader's Digest.

Sleeper, Ramsey, Architecture Graphic Standards (7th Edition) Wiley.

Smith Materials of Construction McGraw-Hill Ryerson.

Gill, Rendering with Pen and Ink, Van Nos Reinhold.

Wallach, Basic Architectural Drafting, Gage Publishing Co.

*Refers to primary text.

CONTENT SUMMARY

1. Architectural Drafting:
   - drafting practices
   - planning
   - structural systems
   - working drawings
   - perspective drawings

2. Computer Graphics (optional)

TOPIC 1: ARCHITECTURAL DRAFTING VD22B

GENERALIZATION: Architectural drafting is the standardized means of accurately transmitting and recording ideas and information necessary for the planning and erection of structures.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Drafting practices	- correctly execute lines, symbols, lettering notes, abbreviations and dimensions as dictated by standard architectural drafting practices	125 hours	
2. Planning:	- given the appropriate information:		
- floor plans	- draw a floor plan		
- elevations	- draw various elevations		
- orientation	- considering physical and cultural features, draw a plot plan, in accordance with local by-laws		
- Presentation drawings	- given his/her own preliminary studies draw the residence in perspective and add foreground, middle ground and background to give the residence an appropriate setting which will best represent his/her design		
3. Structural systems	- draw and sketch wall sections through post and beam, wood frame, solid masonry, brick, veneer construction		

NOTES:

TOPIC 1: ARCHITECTURAL DRAFTING (continued) VD22B

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	- describe the properties of wood, plywood, yard lumber, concrete - draw and/or sketch joist to foundation framing; roof truss and gang nails or gussets; column footing beam and joist connection with hangers, etc. - given tables in RESIDENTIAL STANDARDS and CANADIAN WOOD FRAME HOUSE CONSTRUCTION, select columns, beams, joists and trusses for a specific residence		
4. Working drawings	- given preliminary drawings of a house draw a set of working drawings, that conform to NRC "Residential Standards" and accepted architectural drafting practices		
5. Perspective drawing	- sketch objects in - 1 point perspective - 2 point perspective - 3 point perspective and use these in the 3 various horizon line positions - draw to scale in 1 point and 2 point perspective simple objects such as garages, etc.		

NOTES:

TOPIC 2: COMPUTER GRAPHICS (optional) VD22B

GENERALIZATION: Computers linked to plotters assist drafters in the design and production of drawings.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
Computer Assisted Drafting (C.A.D.)	The student will: - use a computer linked X.Y. plotter to produce simple drawings where equipment is available		

NOTES:

DRAFTING 22C

COURSE CONTENT

DRAFTING 22C (5 CREDITS)
(TOPOGRAPHICAL DRAFTING)

INTRODUCTION

Drafting 22C, Topographical Drafting follows Drafting 12 or Industrial Education 10 and is terminal.

OBJECTIVES

The objectives of Drafting 22C are:

1. To provide students with basic knowledge and skills in the topographical drafting field.

REFERENCES

*Sloane and Montze, Elements of Topographical Drawing McGraw-Hill Ryerson.

Chevrier, Topographic Map and Air Photo Interpretation, Macmillan, Toronto.

Edward, Bennison, Introduction to Geological Structures and Maps Macmillan, Toronto.

Nelson, John A., Drafting for trades and Industry Civil.

Knowles, R., Stowe, P.W.E., North America in Maps, Delmar.

Atlas of Alberta, School Book Branch, Alberta Education.

Baldock, E.D., Map Production, Information Canada.

Bartholomew, John, The Times' Atlas of the World, The Times.

Boggs, Maps - How To Read and Interpret Them, Clark, Irwin.

Bygott, John, Introduction to Mapwork and Practical Geography, University Tutorial Press.

Department of Mines and Resources, Ottawa, Every Square Inch.

Dickinson, G., Maps and Air Photographs, Macmillan, Toronto.

Gopsil, G., Practical Geography, Macmillan, Toronto.

Greenhood, David, Mapping, University of Toronto Press.

Marsh, All About Maps and Map Making, Random House.

Minshull, Roger, Landforms from the Air, Macmillan, Toronto.

Raisz, E., Principles of Cartography, McGraw-Hill Ryerson.

Roblin, H.S., Map Projections, Macmillan, Toronto.

Supplement to the Manual of Instruction of Survey of Canada Lands, Ottawa: Queen's Printer.

*Refers to primary text.

Basic Student References

Source "The Experience" Group, 4041 West 36th Avenue, Vancouver, B.C.

EG Representative Topographic Maps of Canada (book of 10 pkgs).

EG 302 Structured Pictures of North America

Alberta Township Plans

Alberta Government Map (1" - 16 miles)

Topographical Maps (Federal), Scale 1:50,000, Queen's Printer, Ottawa

Topographical Maps, Scale 1:25,000, Queen's Printer, Ottawa

Air Photographs, Ottawa

CONTENT SUMMARY

1. Surveying
   - gathering data
   - surveying

2. Topographic Drafting (Cartography)
   - drawing equipment
   - interpretation of field notes
   - photogrammetry
   - geographical data
   - methods of map projection (optional)
   - modelling (optional)

TOPIC 1: SURVEYING VD22C

GENERALIZATION: Surveying is a method of measuring accurately horizontal and vertical angles and distances.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Gathering Data	- given the requirements for the use of a map, list the features to be shown and discuss the accuracy desirable in locating these features for the use of the map maker	60 hours	
	- compile a list of all features shown on a topographic map		
2. Surveying	- chain a staked area and check		
	- set up transit		
	- plumb to a point on the ground		
	- give angular readings from the horizontal		
	- give horizontal readings between points on the ground		
	- find the elevations of a series of points in reference to a bench mark		

NOTES:

TOPIC 2: CARTOGRAPHY VD22C

GENERALIZATION: Cartography is the art of making an accurate map.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Drawing equipment	- use scale ratios for any measurement and draw a city or town lot plan - use ruling pens, gauge pens, compass, reservoir pens and contour pens, to complete ink drawings - use mechanical lettering set - color maps using appropriate equipment (crayons, solvents, paints, dyes, etc.) - examine and experiment with "stick-ons" and "rub-ons" such as Letraset	65 hours	
2. Interpretation: - field notes	- given complete survey field notes make scale drawings of surveys following the field notes and mathematically calculate the corrections for closure - draw contours, given elevation data		
3. Photo-grammetry	- use air photos and transparent film, to transfer topographical information to a map grid of the same area		

NOTES:

TOPIC 2: CARTOGRAPHY (continued) VD22C

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	- use air photos, stereoscope and ink equipment, to draw in relief by using such symbols as hachures or line shading		
4. Geographical Data: - direction	- use a map of a specific location, to find angular readings, magnetic readings, and calculate declination and true North		
- location	- use a map with latitude and longitude, to locate a given feature and properly record the location		
	- set up a latitude-longitude grid		
	- draw a map using the third system of survey		
- relief	- use a road map and topographic maps, to plan a road trip or hike		
	- use published topographical maps, to calculate the gradient, and produce a cross sectional drawing		
5. Methods of Map Projection (optional)	- draw: - mercator grids - conic projections		
6. Modelling (optional)	- build an accurate model with all features properly color coded		

NOTES:

TOPIC 3: COMPUTER GRAPHICS (optional) VD22C

GENERALIZATION: Computers linked to plotters assist drafters in the design and production of drawings.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
Computer Assisted Drafting (C.A.D.)	The student will: - use a computer linked X.Y. plotter to produce simple drawings where equipment is available		

NOTES:

DRAFTING 32A

COURSE CONTENT

DRAFTING 32A (5 CREDITS)
(ENGINEERING GRAPHICS)

INTRODUCTION

Drafting 32A, Engineering Graphics, follows Drafting 22A and is appropriate for serious drafting students or students wishing to enter engineering.

OBJECTIVES

The objectives of Drafting 32A are:

1. To provide students with in-depth studies and experiences in engineering graphics.

2. To develop further understanding and skills required of drafters.

REFERENCES

Earle. J.H., Descriptive Geometry (2nd Edition) Addision Wesley.

*French, Svenson, Helsel, Urbanek, Mechanical Drawing (S.I. Metric). McGraw-Hill Ryerson.

French, T.E. and C.J. Vierch, Graphic Science: Engineering Drawing, Descriptive Geometry Graphic Solution McGraw-Hill, 1970.

Giachino, J.W. and H.J. Beukema, Engineering-Technical Drafting and Graphics General Publishing Co. Ltd.

Giachino, J.W. and H.J. Beukema, Engineering-Technical Drafting and Graphics, Study Guide 2 General Publishing Co. Ltd., 1967.

Giesecke, F.E. et al. Technical Drawing. Fifth edition. Collier-Macmillan Canada, Ltd.

Jensen, C.H. Engineering Drawing and Design McGraw-Hill Ryerson, 1968.

Lusadder, Basic Graphics Prentice-Hall.

Slaby, Steve, Fundamentals of Three-Dimensional Descriptive. Harcourt, Brace and World.

Wallach, Metric Drafting, Glencoe.

Weaver, Rip, Process Piping Drafting (2nd Edition) Gulf.

*Refers to primary text.

CONTENT SUMMARY

1. Auxiliary Views
   - primary auxiliary views
   - secondary auxiliary views

2. Revolutions
   - simple and successive revolutions

3. Intersections and Surface Development
   - intersections
   - developments of truncated shapes
   - triangulation

4. Resolution of Forces
   - resultant of forces

5. Piping Drawings
   - materials used in piping
   - joining pipe and tubing
   - pipe fittings
   - representing piping systems

TOPIC 1: AUXILIARY VIEWS VD32A

GENERALIZATION: Views other than the principal views are sometimes required to describe special features of an object.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
1. Primary Auxiliary Views 2. Secondary Auxiliary Views	The student will: - produce drawings that require the projection of primary auxiliary views, some of which contain circles and/or irregular features - determine true size and shape of inclined surfaces - produce drawings that require the projection of secondary auxiliary views, some of which contain circles - determine the true size and shape of oblique surfaces	35 hours	

TOPIC 2: REVOLUTIONS VD32A

GENERALIZATION: Objects are rotated in space to obtain a maximum view of the inclined or oblique surface.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
1. Simple and Successive Revolutions	The student will: - rotate and draw various objects around different axis - choose between secondary auxiliary views and revolutions to find true size and shape of surfaces	30 hours	

TOPIC 3: INTERSECTIONS & SURFACE DEVELOPMENT VD32A

GENERALIZATION: Intersections and developments are necessary for the fabrication of products manufactured from sheet materials.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Intersections	- plot intersections of planes with prisms, cylinders, pyramids and cones	30 hours	
2. Developments of truncated shapes	- draw and develop surfaces of truncated prisms, pyramids, cylinders and cones		
	- construct models from paper or cardboard		
3. Triangulation	- draw and develop patterns for various transition pieces using the principles of triangulation		

TOPIC 4: RESOLUTION OF FORCES VD32A

GENERALIZATION: Many forces act upon a body which can be resolved into a single force.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Resultant of Forces	- given two, three, or more forces, find the resultant force	5 hours	
	- given forces along a given direction resolve into two or more forces		

TOPIC 5: PIPING DRAWINGS VD32A

GENERALIZATION: Liquids and gases are transported through piping systems which have been designed and drawn in engineering offices.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Materials used in piping	- review material presented in Drafting 22A	25 hours	
	- explain where piping materials are used and outline the advantages and disadvantages of each: (cast iron, steel, alloys, non-ferrous metals, plastic, concrete, ceramic, tubing)		
2. Joining pipe and tubing	- explain how pipes are joined together into piping systems (e.g., threaded, welded, flanged, bell and spigot, soldered)		
3. Pipe fittings	- explain where various fittings are used in piping systems		
	- design simple piping systems employing a variety of fittings		
4. Representing piping systems	- produce flow diagrams of piping systems		
	- produce schematic drawings of piping systems		
	- produce working drawings of piping systems using double line drawing, multiview single line drawings and pictorial single line drawing		

DRAFTING 32B

COURSE CONTENT

DRAFTING 32B (5 CREDITS)
(ADVANCED ARCHITECTURAL DRAFTING)

INTRODUCTION

Drafting 32B, Advanced Architectural Drafting, follows Drafting 22B. It is designed to increase further, students understanding of architectural drafting.

OBJECTIVES

The objectives of Drafting 32B are:

1. To increase students knowledge and skills in architectural drawing.

2. To provide students with the ability to read and interpret the appropriate building codes and standards.

REFERENCES

*Hepler and Wallach, Architectural Drafting Design (3rd edition) McGraw-Hill Ryerson.

Earle, James H., Engineering Design Graphics, Addison-Wesley Publishing Co. Reading, Massachusetts, 2nd Edition, 1973.

Jensen, C. Engineering Drawing and Design (2nd edition). (SI Metric) McGraw-Hill Ryerson.

Spence, Architecture Design Engineering Drawing (3rd edition). McKnight Publishing Co.

Building Construction Handbook McGraw-Hill Ryerson.

Gill, Rendering with Pen and Ink, Van Nos Reinhold.

Humphreys, Barbara, Architecture as Living History, Reader's Digest.

Sleeper, Ramsey, Architectural Graphic Standards (7th edition), Wiley.

Slaby, Steve M., Fundamentals of Three-dimensional Descriptive Geometry, Harcourt, Brace & World, 1966.

Smith, Materials of Construction, McGraw-Hill Ryerson.

Spence, William P., Drafting Technology and Practice, Chase, A. Bennet Co. Inc., Peoria, Illinois, 1973.

Wallach, Basic Architectural Drafting, Gage Publishing Co.

*Refers to primary text.

CONTENT SUMMARY

1. Advanced Architectural Drafting
   - planning and design
   - structural systems
   - working drawings

TOPIC 1: ADVANCED ARCHITECTURAL DRAFTING VD32B

GENERALIZATION: Architectural Drafting is the standardized means of accurately transmitting ideas and information necessary for the planning and erection of structures.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Planning and Design: - light commercial facilities	- plan a building to meet the needs of the client and to satisfy the basic elements of good design. Do preliminary sketches of a shoe store, barber shop, or other "one man" operations - sketch plot plan, floor plan, elevations	125 hours	
- presentation of design	- sketch or draw a two-point or one-point perspective and render it - sketch the interior of a commercial building in one or two-point perspective		
2. Structural Systems: - materials	- describe the composition, physical and mechanical properties of a structural material such as: - timber - steel - concrete - reinforced concrete - finish material		
- construction details	- given a structure of wood, steel, or concrete, draw or sketch standard construction details for the various members in that structure		

NOTES:

TOPIC 1: ADVANCED ARCHITECTURAL DRAFTING (continued) VD32B

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- fastening structural members	- sketch or draw trusses, beam and post connections, joist and beam connections, foundation buttresses three hinged arches, etc. - given a problem from a reference text, draw complete working drawings for steel, columns and trusses showing framing, connection and hardware details with the correct information - sketch or draw bolting connections - sketch welding connections - produce erection drawings - produce a set of erection plans from shop drawings - complete placing drawings and bar bending lists for a simple structure selected from a reference text - given a simple structure and reinforcing concrete manual, draw the required placing drawings, and make bar bending lists for the reinforcing steel		

NOTES:

TOPIC 1: ADVANCED ARCHITECTURAL DRAFTING (continued) VD32B

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
3. Working Drawings	- draw a pre-planned interior arrangement, exterior and structural system draw plot plan, basement plan, floor plans, door and window details, exterior elevations, sections, construction details, framing plans, schedules and specifications, etc. of a small commercial building		

TOPIC 2: COMPUTER GRAPHICS (optional) VD32B

GENERALIZATION: Computers linked to plotters assist drafters in the design and production of drawings.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
Computer Assisted Drafting (C.A.D.)	The student will: - use a computer linked X.Y. plotter to produce simple drawings where equipment is available		

NOTES:

DRAFTING 32C

COURSE CONTENT

DRAFTING 32C (5, 10 CREDITS)

INTRODUCTION

The last module of the Drafting sequence is open to students who have completed 30 credits or six modules in the major.

The 125 hours of instruction time available in this module may be used to:

a. Provide greater depth to a module taken previously. Individual students, groups of students or whole classes may elect to study an area in more detail.

b. Engage in on-the-job Drafting supervised by the Drafting teacher as a coordinator and a competent person on the job.

c. Take instruction in a related field such as Building Construction or Machine Shop.

REFERENCES

Demel, Wilke, Coppinger, Barr, Computer Graphics, Creative Publishing Co.

French, T.E. and C.J. Vierch. Graphic Science: Engineering Drawings Descriptive Geometry Graphic Solution. McGraw-Hill, 1970.

French, T.E. and C.J. Vierch. A Manual of Engineering Drawing for Students and Draftsmen. Fifth edition. McGraw-Hill Ryerson.

Giachino J.W. and H.J. Beukema. Engineering-Technical Drafting and Graphics. General Publishing Co. Ltd.

Giachino, J.W. and H.J. Beukema. Engineering-Technical Drafting and Graphics, Study Guide 2. General Publishing Co. Ltd., 1967.

Giesecke, F.E. et al. Technical Drawing. Fifth edition. Collier-Macmillian Canada, Ltd.

Jensen, C.H. Engineering Drawing and Design. McGraw-Hill, 1968.

Lusadder. Basic Graphics. Prentice-Hall.

American Concrete Institute. Manual of Standard Practice for Detailing Reinforced Concrete Structures.

American Institute of Steel Construction. Manual of Steel Construction.

American Institute of Steel Construction. Structural Shop Drafting, Volumes 1 & 2.

Canadian Government Specifications Board. Architectural Drawing Practices.

Canadian Institute of Steel Construction. Elementary Structural Shop Drafting.

French, Thomas E. and Vierck, Charles J., The Fundamentals of Engineering Drawing and Graphic Technology, McGraw-Hill Book Co., New York, 3rd Edition, 1972.

Goodban and Hayslett. Architectural Drawing and Planning. McGraw-Hill Ryerson.

Harperin. Building With Steel. American Technical Society.

Hornung. Architectural Drafting. Prentice-Hall.

Luzaddar, Warren J., Fundamentals of Engineering Drawing, Prentice-Hall Inc., Englewood Cliff, New Jersey, 7th Edition, 1977.

Pare, E.G., Loving, R.O., Hill, I.F., Descriptive Geometry, Macmillan, NY.

T 351-5 A32 1982
DRAFTING 12-22-32 INDUSTRIAL
EDUCATION CURRICULUM GUIDE --

39830562 CURR HIST

000022502157

DATE DUE SLIP

T 351.5 A32 1982
Alberta. Alberta Education.
Drafting 12-22-32 :

39830562 CURR HIST

CURRICULUM GUIDE

For Reference

NOT TO BE TAKEN FROM THIS ROOM

EXCEPT WITH LIBRARIAN'S PERMISSION